printed edition of Euclid's "Elementa Geometriæ" (1482); the first edition of de Caus's "Les Raisons des Forces mouvantes" (1615), to which, according to Arago, is due the invention of the steam engine; Daguerre's description of his invention of the Daguerreotype process of photography (1839), and the earliest works on ballooning. Bibliophiles and librarians looking out for scientific works of great rarity and interest, or for volumes of Proceedings of scientific societies and standard books on the exact sciences, will find it an advantage to consult the interesting catalogue the first part of which Messrs. Sotheran have just published.

MESSRS. GEORGE PHILIP AND SON, LTD., will shortly issue a novel perpetual calendar invented by the Rev. J. W. Wiles. It is claimed that by a simple arrangement the calendar will show the day of the week of any day in any year from the beginning of the Christian era to the end of time.

MR. W. A. SHENSTONE, F.R.S., has revised, and in some instances amplified, the essays he recently contributed to the *Cornhill Magazine*, and they will be published by Messrs. Smith, Elder and Co. to-morrow under the title of "The New Physics and Chemistry: a Series of Popular Essays on Physical and Chemical Subjects."

MESSRS. ARCHIBALD CONSTABLE AND CO., LTD., will publish very shortly a volume by Prof. E. Ray Lankester, F.R.S., entitled "The Kingdom of Man," containing a statement of the present position of scientific knowledge and the promise of the future.

THE second quarterly number of *Science Progress in the Twentieth Century* has now been published by Mr. John Murray. The ten articles included in this issue of the new scientific quarterly review range over many departments of science, and should appeal to a wide circle of readers.

THE first parts of two works of science which are being published serially by Mr. Fritz Lehmann, Stuttgart, have been received. "The Macrolepidoptera of the World," by Dr. Adalbert Seitz, is to be completed in 100 parts, and "Das Mineralreich," by Dr. Reinhard Brauns, in seventy-five parts. Both works are illustrated by excellently produced coloured plates. Messrs. Williams and Norgate are the agents of the publishers in this country.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN NOVEMBER:—

Nov. 5. 11h. 24m. to 12h. 34m. Moon occults ν Geminorum (mag. 4·1).
9. 9h. Mercury at greatest elongation (E. 23° 0′).
10. 12h. 17m. to 13h. 33m. Transit of Jupiter's Sat. IV. (Callisto).
11. 7h. 15m. to 10h. 15m. Transit of Jupiter's Sat. III. (Ganymede).
15. Saturn. Major axis of outer ring $=41''\cdot27$; minor $4''\cdot64$.
,, 9h. 33m. Minimum of Algol (β Persei).
15. Venus. Illuminated portion of disc $=0\cdot070$; of Mars $=0\cdot959$.
15–16. Epoch of November Leonids (Radiant $151°+23°$).
17–21. Epoch of November Andromedids (Radiant $25°+43°$).
18. 6h. 21m. Minimum of Algol (β Persei).
18. 10h. 45m. to 13h. 46m. Transit of Jupiter's Sat. III. (Ganymede).
19. 5h. 30m. to 6h. 34m. Moon occults o Sagittarii (mag. 3·9).
25. 14h. 11m. to 17h. 12m. Transit of Jupiter's Sat. III. (Ganymede).

GREENWICH OBSERVATORY AND THE POWER STATION.—At the meeting of the Astronomische Gesellschaft recently held in Jena (September 12–15) Dr. Foerster directed attention to the erection of the large generating station near to Greenwich Observatory, and the consequent interference with the work of the institution. After Prof. Dyson had described the unfavourable position in which the observatory is situated, a resolution having the following effect was passed:—That the convention of the International Astronomische Gesellschaft, meeting in Jena, in view of the communication made in the latest report of the Greenwich Observatory, expresses the hope that the loss which would be occasioned if the observatory were removed may be averted. The resolution also expressed the hope that, as Greenwich has succeeded in establishing itself as the standard place, all future proposals to remove it may likewise be averted (*Astronomische Nachrichten*, No. 4127).

LUNAR CHANGES.—In No. 588 of the *Astronomical Journal* Prof. W. H. Pickering discusses Mr. Stebbins's observations of the lunar crater Linné, made during the eclipse of the moon which took place on February 8, 1906, and compares them with the similar observations made at the same time by Prof. Frost. Although some slight doubt exists as to the precision of one or two of Mr. Stebbins's measures, the curve showing the change in diameter of the spot surrounding Linné, according to his observations, agrees in general with the similar one obtained by Prof. Frost. Both show a substantial increase in the diameter immediately after the passing of the earth's shadow. Prof. Pickering ascribes this increase of diameter to the deposition of hoar-frost, or something analogous to it, caused by the drop in temperature consequent upon the screening off of the sun's rays by the opaque body of the earth. This phenomenon has now been observed by six observers working quite independently, several of whom were originally prejudiced against it, therefore Prof. Pickering considers that it may be accepted as confirmed.

The variation of the diameter of the spot during the ordinary course of lunation has similarly been confirmed by several observers, one of whom, Dr. C. W. Wirtz, discusses his observations at some length in No. 4118 of the *Astronomische Nachrichten*.

ECLIPSE OBSERVATIONS.—In No. 9, vol. xxxv., of the *Memorie della Società degli Spettroscopisti Italiani*, Prof. Riccò concludes his account of the eclipse observations made by the Italian expedition to Alcala de Chivert in August, 1905. Among other matters he discusses "white prominences," and describes those seen during the eclipse in question as faint and indistinct, especially in the lower parts, and appearing as little more than a whitish shadow projected on to the background of the corona. He also suggests that these objects are in nature somewhat of an intermediate stage between the prominences and the true coronal streamers.

Estimating the height of the various layers of the solar atmosphere by two independent methods, Prof. Riccò found that that which he calls the "reversing layer," or the stratum producing the so-called "flash spectrum," extends to some $3''$ or 2000 km. (1250 miles). That part of the chromosphere which emits D_3 and F especially has a height of about $7''$ to $9''$, whilst the calcium vapours of the chromosphere extend to about $15''$ from the base. Photographs taken on special plates with a prismatic camera show that the maximum brightness of the continuous spectrum of the corona occurs in the yellow and red regions.

THE ZODIACAL LIGHT.—During the past summer Prof. Barnard, at the Yerkes Observatory, made a number of observations of the zodiacal light, the results of which he now publishes in No. 2, vol. xxiv., of the *Astrophysical Journal*. On June 22 he paid special attention to the phenomenon, and found it to be much more extensive than he had previously supposed. He concludes that the light extends at least 65° north and south of the sun (assuming the southern extent to be the same as the northern), a value considerably larger than that arrived at by Prof. Newcomb, observing in Switzerland, in the summer of 1905.

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THE MIRA MAXIMUM OF 1906.—In No. 4110 of the *Astronomische Nachrichten* Prof. Nijland publishes the results of his observations of Mira made during the period August 24, 1905, to February 24, 1906. The curve accompanying the paper shows that a sharp maximum occurred on January 3, when the star's magnitude was 3·9. This was preceded by a very flat minimum of about the ninth magnitude, extending from the commencement of the observations until November 9, 1905, and then a steep ascent to the maximum. The lowest magnitude, 9·05, occurred on September 23, 1905.

METEOROLOGY OF THE NILE VALLEY.[1]

THE Egyptian Survey Department, constituted some years ago, is adding largely and rapidly to our knowledge of the hydrography, geology, and meteorology of the Nile basin. The director-general, Captain Lyons, R.E., has prepared and issued a monograph dealing very fully with the physiography of the Nile basin. In this work, which was reviewed in NATURE of September 6 (vol. lxxiv., p. 461), he combines the results of former observers and investigators with the data accumulated during the past ten or twelve years by his department. It is a storehouse of information relating to that most remarkable, and until recent years most mysterious, of rivers.

We propose to give a brief statement, based on the information contained in the monograph, of the more important features of the meteorology of the Nile Valley and their relations to the physiography of the whole area.

The river obtains its supplies from two collecting areas, one the equatorial lake plateau (between lat. 5° S. and lat. 5° N., and long. 28° and 35° E.), and the second the Abyssinian mountain and plateau area (between lat. 7° N. and 14° N., and long. 35° and 40° E.).

The former is the larger catchment basin, and includes the Victoria, Albert Edward, and Albert Lakes, which serve as reservoirs to store the rainfall of the whole region. The Victoria Lake (equal in area to Scotland) is about 4000 feet above the sea, and is slightly lower than the mean level of the plateau. The ground rises slightly to the south and east, and rapidly to the west to the elevated peaks of Ruwenzori, which separate it from the rift valley, in which are situated the Albert Edward and Albert Lakes connected by the Semliki River. The catchment area of the Victoria Lake is only of comparatively small extent, not more than twice the area of the lake, the level of which hence varies very slightly with the season. The Victoria Nile, which issues from the north of the lake, is precipitated over the Ripon Falls, and thence passes over flat, marshy ground to the Choga Lake Swamp, and descends by a series of rapids, and finally by the Murchison Falls, to the lower level of the Albert Lake at its northern extremity in lat. 2¼° N.

The Albert Edward and Albert Lakes, with their tributaries, appear to collect a larger volume of water than the Victoria Lake. The Victoria Lake discharges by the Victoria Nile a nearly constant amount, averaging 500 cubic metres per second, and the Albert Lake amounts varying between 500 and 1100 cubic metres per second.

The discharge of the lake system is carried off northwards from the Albert Lake by the Bahr-el-Jebel, or Albert Nile, as it is called by Sir William Willcocks. It descends rapidly from a level of 2300 feet to 1500 feet at Gondokoro (lat. 5° N.), in a narrow channel with numerous falls and rapids, and thence to Lake No (lat. 9½° N.) through an extensive flat and swampy region. It is joined at Lake No by the Bahr-el-Gazal, and about eighty miles further down stream by the Sobat. The former drains a large portion of the Soudan, its head-waters being chiefly in the equatorial belt. The Sobat is formed partly by drainage from the same belt and partly from the southern face of the Abyssinian plateau.

Between Lake No and Khartoum, the main stream is now known as the White Nile. The discharge of this river below Lake No varies to a slight extent during the year, and averages only 350 cubic metres per second, and hence considerably less than the supply passing into the river from the Albert Lake. The difference represents the loss by evaporation in the extensive swamp region through which these streams flow. That of the Sobat is only considerable during the rainy season, from April to December, ranging between 380 cubic metres and 1470 cubic metres per second. The White Nile below the junction of the Sobat (lat. 9½° N.) to Khartoum (lat. 15½° N.) receives no affluent, and flows in a broad valley as a wide stream of moderate velocity. This part of the Nile plays a subordinate but important *rôle* with respect to the Nile floods. From May to September the flood water brought down by the Sobat River is ponded up or held back in this reach of the Nile, and hence does not contribute to the Lower Nile flood. Captain Lyons states that this action stores up an average of about 1500 million cubic metres from the Sobat flood, which is supplied to the Nile in October, November, and December, thus prolonging the period of the Nile flood, and delaying the fall of the Nile to its low-water stage.

The main flood water of the Nile is brought down by the Blue Nile and the Atbara from the Abyssinian plateau. The rainfall occurs between June and September, and is immediately discharged down the hills into the valleys, the greatest portion down the Blue Nile, which joins the White Nile (there forming the Nile) at Khartoum. The maximum flood of the Blue Nile is about 12,500 cubic metres, and of the Atbara 5000 cubic metres, per second.

The Nile flood proper is hence due solely to rainfall in the Abyssinian and adjacent Soudan area. It commences in June, and reaches its maximum about the end of August or beginning of September. The maximum height of the Nile flood, or the total discharge during the flood period, may hence be accepted as a measure of the total rainfall over that area, just as the variations of the Victoria and Albert Lakes represent the seasonal variations of the rainfall in their catchment areas.

The Nile below the junction of the Atbara (lat. 18° N. to lat. 34° N.) receives no affluents, and flows in a comparatively narrow valley, over which the flood waters, with their rich alluvial contents, are distributed by means of a vast system of canals.

The Nile basin may hence be divided into three areas or regions, not differing greatly in breadth from south to north. The most southerly is the equatorial lake belt between lat. 5° S. and 5° N., an intermediate region between lat. 5° N. and lat. 18° N. includes the Soudan and Abyssinia, and the northerly region comprises the lower Nile basin from lat. 18° N. to the Mediterranean in lat. 34° N. The low river supply (January to May) is chiefly due to discharge from the equatorial lake area, and the summer flood supply to discharge from the Abyssinian region.

The following gives a sketch of the more important features of the meteorology of the Nile basin, based on the important information and data of Captain Lyons's monograph.

Temperature is remarkably uniform in the equatorial lake region. Thus at Entebbe, on the north shore of the Victoria Nyanza, it ranges only between a mean of 72°·7 in January and 70° in July. In the Nile basin north of about lat. 5° N. temperature is lowest in January, and attains its maximum in May in the southern half of the valley south of Khartoum, and in July in Nubia and Egypt. The annual range of temperature increases northwards from the equatorial belt to northern Egypt. The greater part of the Nile basin is within the tropics, and is throughout the whole year characterised by high temperature. That portion of it between lat. 15° N. and lat. 18° N. (in which are the meteorological stations of Khartoum, Berber, and Dongola) is the hottest and driest area in the Nile basin. It has an elevation of about 1200 feet. To the south is the comparatively damp and cooler region of the Bahr-el-Gazal, the Albert Nile, and the lake plateau, whilst to the north the valley descends slowly to the relatively cool Mediterranean coast. This—the Soudan hot area—is one of the hottest regions in the world. The following gives a comparison of the mean monthly maximum temperature of Berber in that area, and of Jacobabad, the hottest station in India, and also of Massawa, on the Red Sea, in the same latitude as Berber :—

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[1] "The Physiography of the River Nile and its Basin." By Captain H. G. Lyons, R.E., Director-General Egyptian Survey Department.

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